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(57) Abstract

A capital expenditure decision support system for evaluating capital expenditure proposals. The system includes means to compute a number of financial indicators from asset, depreciation and tax information entered by a user. Multiple asset lifetimes for each asset involved in a proposal are accommodated in the computations. The system further displays information to the user regarding alternatives for achieving capital expenditure opportunities and gives information for the user to evaluate the alternatives. Further, the system evaluates assumptions made by the user in entering information for use in the computations.

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CAPITAL PROJECT APPRAISAL SYSTEM

Technical Field

This invention relates to an automated capital project appraisal system.

More specifically the invention relates to improvements in systems used to evaluate capital expenditure proposals within organisations that are focussed on maximising shareholder wealth.

Even more particularly, the present invention relates to a computer based system which accurately and consistently determines financial and economic measures of profitability, having taken account of depreciation and associated taxation implications, the precise timing of cash flows, and various other factors which impact on the viability of capital expenditure proposals.

Background Art

Discounted cash flow (DCF) appraisal techniques have been used for many years by accountants and engineers to assess the viability of capital expenditure (capex) proposals.

Many practitioners use computer spreadsheets, for example Microsoft Excel, to input projected cashflows, and to calculate financial indicators such as Net Present Value (NPV), Internal Rate of Return (IRR) and payback period. These financial indicators are used to evaluate capital expenditure proposals for the purposes of comparison and in order to assist in making a decision whether a proposal is economically justified.

NPV is a DCF technique which compares the value of future cashflows attributable to an investment in today's dollars, with the immediate required outlay. Hence, all future cashflows are discounted (at the cost of capital), back to their present value, and compared with the immediate cost of entering into a capital investment. The NPV is thus the difference between the present values of the project's inflows and the initial outflow(s). If the discounted inflows exceed the outflow(s), the project is said to have a positive NPV.

IRR is another commonly used DCF technique. The IRR represents the rate of return earned by the project itself, representing a discount rate that equates the present value of future cash flows to the initial outlay.

Microsoft (M/S) Excel is one of the most commonly used spreadsheet in the world, and it is on this 'platform' (or on other spreadsheets) that accountants compute the financial indicators and evaluate the financial viability of capital expenditure proposals. The major limitations to the use of spreadsheets for undertaking this analysis are :

If the user chooses to enter annualised cash flow projections, then the algorithms which are built into discounting and compounding formula of spreadsheets are only capable of applying end of year discount factors. In other words, these pre-programmed formula assume that streams of cashflows will be received at the end (and not during) each year. However in practice, few capital expenditure proposals with an economic justification yield financial benefits at the end of a financial or calendar year.

For most, revenue increases and cost savings accrue from month to month, on a uniform, random or seasonal basis. Further, the choice between mid year or end of year discounting factors may have a significant effect on the NPV or IRR outcome produced by DCF analysis. If an inappropriate discounting assumption is made, then an organisation risks making a capital investment decision which is not in its best financial interests. Consideration of this issue is particularly important when using DCF techniques to evaluate whether to buy or lease fixed assets.

Spreadsheets are generic tools which are used for a wide variety of applications, one of which is capital project proposal evaluation. The user is left to enter the required formulas, algorithms and prompts to ensure accurate evaluation of each proposal. However, if the user does not consider all the options or makes an incorrect assumption, any financial indicators computed in the spreadsheet on reliance of the incorrect assumption will not be valid or the user may not evaluate an option that would result in significant advantage.

The formulae built into electronic spreadsheets are limited to discounting or compounding a stream of cash inflows or outflows. Asset depreciation calculations and their tax shields; tax cash flows plus a number of other parameters must be manually modelled by the user. In particular, in order to evaluate a project having a large number of assets involved having different lifetimes, the effects of the residual value of the assets requiring replacement and associated cash flow and tax issues must be entered manually.

While computers have been used for many years to perform discounted cashflow analysis, there is no known system which

automates and embodies the various processes, algorithms and calculations which underpin this analysis. Thus the detailed analysis of capital expenditure proposals has typically remained in the domain of the accountant and is typically slow due the accountant having to manually input the appropriate formulas and algorithms to compute the required financial indicators.

The automation of these processes forms a part of this patent application.

Object of the Invention

It is an object of the present invention to overcome or at least alleviate problems in capital project evaluation systems, or at least to provide the public with a useful choice.

Further aspects and advantages of the present invention may become apparent from the following description, which is given by way of example only.

Summary of the Invention

According to one aspect of the present invention, there is provided a capital expenditure decision support system for evaluating capital expenditure proposals, the system including:

- asset input means adapted to allow a user to input a list of assets involved in a capital expenditure proposal, the cost of each asset, the expected lifetime of each asset and the expected residual value of each asset;

- depreciation rate selection means to select a depreciation rate for each asset; and
- computing means to compute the total depreciation and/or periodic depreciation value of each asset over a predetermined time period and compute one or more financial indicators incorporating the computed depreciation over said predetermined period;

wherein each asset may have a shortened lifetime in relation to said predetermined period and the financial indicators are computed incorporating substantially all cash flows resulting from the expiration of the lifetime of each asset.

Preferably, the system may include a database having regulatory depreciation rates stored therein for use in computing depreciation of each asset inputted by the user.

Preferably, the system may include a matching means to allow an asset to be matched with the correct depreciation rate.

Preferably, the matching means may include a search engine adapted to search for key words in an asset description and match those key words to a depreciation rate stored in said database.

Preferably, the one or more financial indicators may be computed using a discounted cash flow technique.

Preferably, the system may include discount factor selection means adapted to allow the user to select between mid-year or end-of-year discount factors for the discounted cash flow computations.

Preferably, the system may be adapted to allow the user to select between straight line or diminishing value depreciation for each asset.

Preferably, the cash flows resulting from the expiration of the lifetime of each asset may include the resulting tax cash flows.

Preferably, the asset input means may further allow assets to be added to or removed from the analysis at specified times during the predetermined time period, wherein the one or more financial indicators are computed taking into account the effect of the addition or removal of each asset.

Preferably, the system may include means for the user to input capital cash flow and interest rates into a template, wherein the computing means computes a capitalised interest value for inclusion in the computation of the one or more financial indicators.

Preferably, the system may include a robustness test, whereby a series of questions relating to known and predetermined assumptions involved in capital expenditure proposal evaluation are communicated to the user, thereby prompting the user to check that their assumptions are valid.

Preferably, the computing means may be adapted to compute an economic replacement point for each asset from values of each asset entered by the user.

Preferably, the one or more financial indicators may be selected from net present value; internal rate of return; discounted

and undiscounted payback period; profitability index; equivalent annual value; and present value index.

Preferably, the system may compute one or more further financial indicators selected from Earnings Before Interest and Tax, Accounting Rate Of Return and Net Operating Profit After Tax.

Preferably, the system may further include selection means to allow a user to select an opportunity for evaluation from a predetermined list of opportunities relating to capital expenditure.

Preferably, the system may display information detailing issues and alternatives that should be considered by the user when evaluating the opportunity to the user upon selection of an opportunity.

Preferably, the system may further compute a required cash flow to achieve a required return, the required cash flow being computed from a set of parameters including the required return, project life, and depreciation rate for each asset.

Preferably, the set of parameters may further include one or more tax rates on cash flows.

Preferably, the set of parameters may further include the cost of capital.

According to another aspect of the present invention, there is provided a capital expenditure decision support system for evaluating capital expenditure proposals, the system including:

- selection means to allow a user to select an opportunity for evaluation from a predetermined list of opportunities relating to capital expenditure;
- storage means for storing financial information relating to each opportunity, said information including alternatives for achieving the opportunity and a set of predetermined issues to be considered by the user in deciding between said alternatives; and
- display means for displaying a portion of said financial information to said user upon selection of an opportunity, wherein the portion displayed is dependent on the opportunity selected.

Preferably, the predetermined issues may be presented to the user in the form of a series of questions.

Preferably, the financial information may further include at least one set of questions relating to known and predetermined assumptions involved in capital expenditure proposal evaluation and the system is adapted to display to the user the questions from said set or sets of questions through the display means, thereby prompting the user to check that their assumptions when entering the set of information are valid.

Preferably, the set of questions displayed to the user may be dependent on the opportunity selected by the user.

According to a further aspect of the present invention, there is provided a capital expenditure decision support system for evaluating capital expenditure proposals, the system including:

- selection means to allow a user to select an opportunity for evaluation from a predetermined list of opportunities relating to capital expenditure;
- computation means for computing a set of financial indicators relating to the opportunity from financial information inputted by the user;
- storage means for storing at least one set of questions relating to known and predetermined assumptions involved in capital expenditure proposal evaluation; and
- display means adapted to display to the user a series of questions from said at least one set of questions, thereby prompting the user to check that their assumptions when entering said financial information are valid.

Preferably, the series of questions displayed to the user may be dependent on the opportunity selected by the user.

Preferably, the system may further include a second selection means allowing a user to select specific questions from the at least one set of questions from a list summarising the subject matter to which the question relates.

Preferably, the storage means may also store a plurality of alternatives for achieving each opportunity selectable by the user.

Further aspects of the present invention may become apparent from the following description, which is given by way of example only and with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a flow chart which outlines the inputs, decisions and outputs according to the present invention, and

Figures 2A - 2J shows examples of some of the system screens viewed by the user when the present invention is incorporated into a computer programme.

Figure 2A shows a system screen which enables users to input capital costs pertaining to the capital expenditure proposal, and the projected revenues, savings and operating costs over the life of the project. Users also enter details concerning the project life, the tax rate, and the cost of capital. When using a Windows based operating system, users click on the macro buttons on the top of the page to select the appropriate discounting method, and the tax depreciation type.

Figure 2B shows a system screen which displays calculations of projected tax and accounting depreciation and asset book values (both from an accounting and a tax viewpoint) for each year of a capital project's life.

Figure 2C shows a table which enables users to enter up to three projected residual values for each asset class, over the life of the greater project. An

algorithm calculates the difference between the projected residual value and the adjusted asset value for tax purposes, and enters the tax cash flow in a financial projection schedule.

Figure 2D — Displays the depreciation rates and estimated useful lives for 1 of 19 asset categories. Users select the appropriate asset sub-category, which is down-loaded into the system. A search engine embodied within the computer based method and system automates searches for asset sub-classes.

Figure 2E — Displays a system screen on which users enter inputs to perform a sensitivity analysis.

Figure 2F — Displays the screen upon which data is entered to assess the optimum asset replacement cycle for fixed assets. The equivalent annual values are derived from another module in the system.

Figure 2G — Displays one of a list of criteria for testing the robustness of future cash flow projections. Users provide positive or negative responses to structured questions as part of the process.

Figure 2H — Displays one of many generic classes of capital projects with the potential to yield cost savings or revenue gains. The potential opportunity is described, and users can activate a system screen which provides detailed examples.

Figure 2I Displays a system screen which describes a strategic alternative. Users work through a decision making process for each alternative, selecting responses to structured questions.

Figure 2J Displays a template used for submitting capital expenditure requests. Much of the data is downloaded from another module in the system. When the capital expenditure system is used in conjunction with a Windows based operating system, users click on buttons to activate management procedures.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The following is a detailed description of the features of the system of the present invention implemented on a computer to which this patent application relates, but which is given by way of example only.

The system includes an appropriate operating system software such as Microsoft Windows 95 – 2000, Memphis, or Windows NT. The preferred implementation platform for the system is an IBM compatible personal computer. Individual personal computers can be networked using an intranet, local area or wide area network or networks to give multiple users access.

A flowchart of a method or programme which automates the various processes and calculations which underpin DCF evaluation of capital projects is shown in Figure 1.

The first aspect is that the system of the invention includes a computer programme executable by computer. The programme contains instruction code for executing a process which is used to identify capital projects which have an economic justification. In other words, whether these projects will make a profit.

The objective of this component of the programme is to assist users to identify opportunities through capital expenditure to add value to their business. Referring to step 100 in Figure 1, users scroll through a 'drop down' menu which contains many generic categories of opportunities realisable through capital expenditure to improve efficiencies. (Figure 2H provides an example.) Users can access a sub-screen to view specific examples of the opportunities as indicated by the "examples" icon in Figure 2H.

By clicking on the brief description of the opportunity, users view a dialogue box which describes the project initiative in generic terms, and also provides a specific example. An enhancement may include provision of a sub-programme which outlines procedures to be followed in the identification process, for given circumstances.

Next, the user must select a project evaluation timeframe, see step 105. The timeframe may correspond to the required payback period or may correspond to the period of planning currently under contemplation. Different timeframes may be used to evaluate the proposal on a short term or a long term basis.

The system integrates into a capex evaluation module, a database of National Tax Authority depreciation rates for the many hundreds of asset depreciation classes. (Refer to 110 on figure 1; also refer to figure 2D.) The objective is to enable the user to make

use of their computer to search and locate the relevant depreciation rate for the class of asset entered and to down load the selected depreciation rate directly into a capital expenditure evaluation programme. The system incorporates a search engine which locates asset depreciation classes, upon the input of key search words. Once the appropriate depreciation rates have been identified, the user may select between diminishing value and straight line depreciation techniques for use by the evaluation programme.

A third aspect of the invention is that it recognises that many capital projects are large and consist of asset components that span across more than one depreciation class, each having different depreciation rates for accounting and tax purposes. Further, the economic lives of the various asset components may be different. Hence, while a building may have a 20 year economic life, components of the building (such as furnishings or computerised control systems) may require replacement more than once within the lifespan of the building itself.

To perform the analysis accurately, it has been necessary to develop a fixed assets table and depreciation algorithm and incorporate it into a computer based financial model - particularly because many capital projects consists of several asset components, each with different depreciation rates and useful lives.

Referring to sections 115 to 135 of Figure 1, the user inputs values relating to assets utilised in the capital expenditure proposal. An algorithm automatically calculates the depreciation of each asset within each asset class based on the information inputted by the user which may include asset categories, the cost of each asset category, the estimated useful lives, the cost and timing of assets

replaced over the greater project's life, estimated residual values for each replacement, tax and accounting depreciation rates, and the depreciation type (i.e. straight line or diminishing value).

A fixed assets algorithm and sub-system has been developed to automate the calculation of depreciation for each specific asset within each of 8 asset classes, for each year over the life of the capital project (refer to figure 2B). It will be appreciated that the number and type of classes and the class each asset falls in may be varied according to specific requirements, for example due variations in tax law between jurisdictions and over time. An important feature of the present invention is that the system allows for an asset to have a shortened lifetime relative to the life of the capital project and automatically incorporates the resultant cash flows from the expiration of the lifetime of an asset. Figure 2C shows a suitable user interface to allow the user to enter in this example up to three disposals for each asset.

The tax shield on depreciation for each asset class is also determined. The system calculates the amount of depreciation over or under recovered at the end of the useful life of each individual asset within each category of asset. (Refer to 150). The programme also determines the amount of taxation to pay or to credit as a consequence of the book profit or loss on disposal. The programme then enters these values on the respective section of a financial evaluation module.

The system also calculates capitalised interest or the interest benefit of deferred payment (refer 140), when modelling the capital costs of larger projects. Capitalised interest represents the interest

costs associated with funding a project during its construction period, ceasing upon the completion of the commissioning phase.

Users enter cash flow projections. The interest rate which applies to project finance is also entered, as well as the projected commissioning date. This feature enables users of the system to simulate the effect of shortening (or lengthening) the project construction period on the overall cost of the project. Users may also consider the financial effects of different payment options. The system integrates a sub-programme which enable users to determine the average cost of capital (refer to 170).

The programme integrates a system which calculates the financial effects of working capital changes which are projected to accrue from acceptance of a capital project (refer to 145). Users enter changes in debtors, inventories, and creditors for each year of the project's life. Working capital changes are then calculated, and the output values are entered on the 'cash outlay' section of the capex evaluation system.

The computer based method and system also enables users to select between the use of mid year and end of year discounting factors. Refer to 175 (also refer to figure 2A). An algorithm has been developed and built into the system which applies true mid year factors to the entered annual cashflows.

The programme includes an interactive menu of alternatives which should be considered by the user in order to derive best value from the planned expenditure relating to a selected opportunity. Refer 185 and Figure 2I. This method includes examples, a structured decision making method, and support tools. For example,

if the user answered YES/MAY BE to the question put forward in Figure 2I, then a predetermined set of structured questions designed to identify specific areas where increased utilisation of existing assets may occur.

The invention embodies a system which contains a list of criteria and a decision support system for testing the robustness of future cash flow projections which the user has estimated. Refer to 205, 220, 225, and 230. The programme includes a selection of important considerations relevant to the capital expenditure proposal, and the user is guided through a number of structured and cascading questions, and examples. The user is prompted to perform the robustness tests to confirm that assumptions are realistic (refer to figure 2G). Figure 2G shows one question that may be asked of the user performing an evaluation of a capital expenditure proposal. The user is asked whether internal margins have been excluded from the analysis to ensure that the analysis is performed from the perspective of the organisation as a whole. Each issue relating to the robustness of the analysis may be selected using a pull-down menu, allowing the user to view areas that they require assistance with and ignore other areas if required.

It will be appreciated that any number of considerations relating to the robustness of the evaluation may be included in accordance with the present invention. The issues covered will include areas known to cause confusion or errors in analysing a capital proposal and may be updated periodically to reflect current practices.

The programme integrates a capital expenditure formal request (CER), and which itself embodies management procedures

using a Windows computer operating system. An example of a completed CER is shown in Figure 2J. A selection of the financial indicators computed may be included in the CER (see the section headed "Financial Justification" and "Sensitivity Analysis") to give a summary of the evaluation process along with any other details which may be required.

The system also includes a sub-system for testing the sensitivity of key parameters which impact on the economics of the capital project. Refer to 210, 235, 240, and 245. The user enters values for different outcomes for each parameter. The percentage probability of the outcomes are also entered on the template by the user, along with the DCF criterion calculated for each scenario. (Refer to figure 2E). Once these values have been entered, the system calculates the expected IRR, NPV or Payback period for each parameter. These expected values take into account the probability scores assigned to the outcomes. The percentage variation between the expected value and the most likely value is then calculated by an algorithm within the programme. The greater the variation, the greater the sensitivity of the parameter being tested.

A further aspect of the computer based method and system is that it incorporates a formula and a methodology for calculating the economic replacement point for capital assets. Refer 215, 250, 255, 260, 265. Users enter on a template which is accessed from a Macro, the cost of the asset and its estimated residual value after each successive year of operation. Operating costs and revenues for each successive year of operation are also entered. Other inputs are the cost of capital and the inflation/deflation rate applicable to the assets capital costs, its operating costs, and revenue projections.

The system calculates the optimum replacement point (in years) using a discounted cashflow formula, and displays the equivalent annual costs for each replacement period iteration. (Refer to figure 2F)

The system further includes an algorithm to allow the computer to compute an annual cash flow annuity which is required to achieve a required return. The user enters the required return, which may be, for example, specified in terms of a rate of return, profitability index threshold, net present value or accounting rate of return. The user also enters the project life, and selects depreciation rates by asset class. Further parameters which may be entered to increase accuracy may include the cost of capital and tax rates relating to the cash flows expected for the project. The system then computes the resultant cash flows of the capital expenditure and takes into account the taxation on those cash flows, including depreciation tax shields, and taxation on depreciation over or under recovered on projected asset residual values. A variation on this feature may include computing the maximum capital expenditure from input parameters of revenues, cost savings and operating costs, thereby providing an indication of the investment that can be made in capital equipment to fund the operations.

Thus, the system enables the users to quickly assess the upper ceiling of the capital expenditure that could be incurred to warrant investment, given the investment thresholds which apply to the user's organisation. Alternatively, the system can inform users of the required minimum annual savings required to sustain a predetermined capital expenditure value. This is in contrast to

existing systems where the process had to be performed manually by a trial and error approach.

Thus, there is provided a capital project appraisal system which automates many of the functions traditionally performed manually and requiring the formation of custom algorithms and functions. The system therefore provides the user with an analysis tool to automate the required calculations and further provide advice to the user to ensure that their assumptions are correct and that they have considered all opportunities.

Where in the foregoing description reference has been made to specific components or integers of the invention having known equivalents then such equivalents are herein incorporated as if individually set forth.

Although this invention has been described by way of example and with reference to possible embodiments thereof it is to be understood that modifications or improvements may be made thereto without departing from the scope of the appended claims.

Claims:

1. A capital expenditure decision support system for evaluating capital expenditure proposals, the system including:
   - asset input means adapted to allow a user to input a list of assets involved in a capital expenditure proposal, the cost of each asset, the expected lifetime of each asset and the expected residual value of each asset;
   - depreciation rate selection means to select a depreciation rate for each asset; and
   - computing means to compute the total depreciation and/or periodic depreciation value of each asset over a predetermined time period and compute one or more financial indicators incorporating the computed depreciation over said predetermined period;

   wherein each asset may have a shortened lifetime in relation to said predetermined period and the financial indicators are computed incorporating substantially all cash flows resulting from the expiration of the lifetime of each asset.

2. A capital expenditure decision support system as claimed in claim 1, including a database having regulatory depreciation rates stored therein for use in computing depreciation of each asset inputted by the user.

3. A capital expenditure decision support system as claimed in claim 2, including a matching means to allow an asset to be matched with the correct depreciation rate.

4. A capital expenditure decision support system as claimed in claim 3, wherein the matching means includes a search engine adapted to search for key words in an asset description and match those key words to a depreciation rate stored in said database.

5. A capital expenditure decision support system as claimed in any one of claims 1 to 4, wherein the one or more financial indicators is computed using a discounted cash flow technique.

6. A capital expenditure decision support system as claimed in claim 5, including discount factor selection means adapted to allow the user to select between mid-year or end-of-year discount factors for the discounted cash flow computations.

7. A capital expenditure decision support system as claimed in any one of the preceding claims, wherein the system is adapted to allow the user to select between straight line or diminishing value depreciation for each asset.

8. A capital expenditure decision support system as claimed in any one of the preceding claims, wherein said cash flows resulting from the expiration of the lifetime of each asset includes the resulting tax cash flows.

9. A capital expenditure decision support system as claimed in any one of the preceding claims, wherein the asset input means further allows assets to be added to or removed from the analysis at specified times during the predetermined time period, wherein the one or more financial indicators are computed taking into account the effect of the addition or removal of each asset.

10. A capital expenditure decision support system as claimed in any one of the preceding claims, including means for the user to input capital cash flow and interest rates into a template, wherein the computing means computes a capitalised interest value for inclusion in the computation of the one or more financial indicators.

11. A capital expenditure decision support system as claimed in any one of the preceding claims including a robustness test, whereby a series of questions relating to known and predetermined assumptions involved in capital expenditure proposal evaluation are communicated to the user, thereby prompting the user to check that their assumptions are valid.

12. A capital expenditure decision support system as claimed in any one of the preceding claims, wherein the computing means is adapted to compute an economic replacement point for each asset from values of each asset entered by the user.

13. A capital expenditure decision support system as claimed in any one of the preceding claims, wherein the one or more financial indicators are selected from net present value; internal rate of return; discounted and undiscounted payback period; profitability index; equivalent annual value; and present value index.

14. A capital expenditure decision support system as claimed in claim 6, wherein the system computes one or more further financial indicators selected from Earnings Before Interest and Tax, Accounting Rate Of Return and Net Operating Profit After Tax.

15. A capital expenditure decision support system as claimed in any one of the preceding claims further including selection means to allow a user to select an opportunity for evaluation from a predetermined list of opportunities relating to capital expenditure.

16. A capital expenditure decision support system as claimed in claim 15, wherein the system displays information detailing issues and alternatives that should be considered by the user when evaluating the opportunity to the user upon selection of an opportunity.

17. A capital expenditure decision support system as claimed in any one of the preceding claims, wherein the system further computes a required cash flow to achieve a required return, the required cash flow being computed from a set of parameters including the required return, project life, and depreciation rate for each asset.

18. A capital expenditure decision support system as claimed in claim 17, wherein said set of parameters further includes one or more tax rates on cash flows.

19. A capital expenditure decision support system as claimed in claim 17 or claim 18, wherein said set of parameters further includes the cost of capital.

20. A capital expenditure decision support system for evaluating capital expenditure proposals, the system including:

- selection means to allow a user to select an opportunity for evaluation from a predetermined list of opportunities relating to capital expenditure;
- storage means for storing financial information relating to each opportunity, said information including alternatives for achieving the opportunity and a set of predetermined issues to be considered by the user in deciding between said alternatives; and
- display means for displaying a portion of said financial information to said user upon selection of an opportunity, wherein the portion displayed is dependent on the opportunity selected.

21. A capital expenditure decision support system as claimed in claim 20, wherein said predetermined issues are presented to the user in the form of a series of questions.

22. A capital expenditure decision support system as claimed in either claim 20 or claim 21, wherein said financial information further includes at least one set of questions relating to known and predetermined assumptions involved in capital expenditure proposal evaluation and the system is adapted to display to the user the questions from said set or sets of questions through the display means, thereby prompting the user to check that their assumptions when entering the set of information are valid.

23. A capital expenditure decision support system as claimed in claim 22, wherein the set of questions displayed to the user is dependent on the opportunity selected by the user.

24. A capital expenditure decision support system for evaluating capital expenditure proposals, the system including:

- selection means to allow a user to select an opportunity for evaluation from a predetermined list of opportunities relating to capital expenditure;
- computation means for computing a set of financial indicators relating to the opportunity from financial information inputted by the user;
- storage means for storing at least one set of questions relating to known and predetermined assumptions involved in capital expenditure proposal evaluation; and
- display means adapted to display to the user a series of questions from said at least one set of questions, thereby prompting the user to check that their assumptions when entering said financial information are valid.

25. A capital expenditure decision support system as claimed in claim 24, wherein the series of questions displayed to the user is dependent on the opportunity selected by the user.

26. A capital expenditure decision support system as claimed in either claim 24 or 25, wherein the system further includes a second selection means allowing a user to select specific questions from the at least one set of questions from a list summarising the subject matter to which the question relates.

27. A capital expenditure decision support system as claimed in any one of claims 24 to 26, wherein the storage means also stores a plurality of alternatives for achieving each opportunity selectable by the user.

28. A capital expenditure decision support system substantially as herein described with reference to the accompanying drawings.

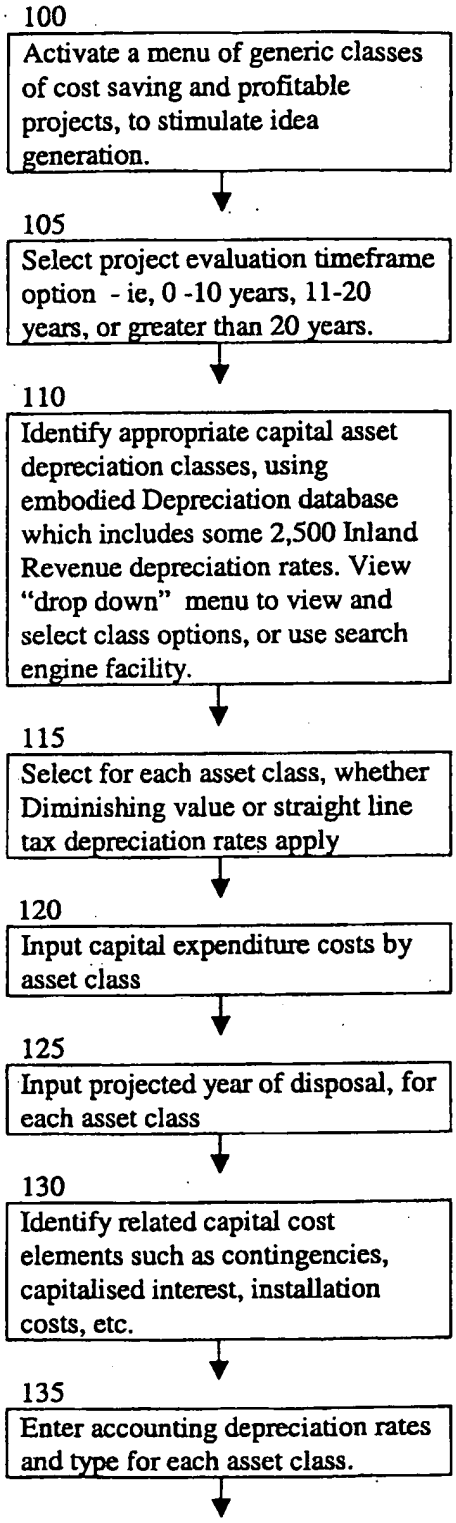

100
Activate a menu of generic classes of cost saving and profitable projects, to stimulate idea generation.
105
Select project evaluation timeframe option - ie, 0 -10 years, 11-20 years, or greater than 20 years.
110
Identify appropriate capital asset depreciation classes, using embodied Depreciation database which includes some 2,500 Inland Revenue depreciation rates. View "drop down" menu to view and select class options, or use search engine facility.
115
Select for each asset class, whether Diminishing value or straight line tax depreciation rates apply
120
Input capital expenditure costs by asset class
125
Input projected year of disposal, for each asset class
130
Identify related capital cost elements such as contingencies, capitalised interest, installation costs, etc.
135
Enter accounting depreciation rates and type for each asset class.

FIGURE 1

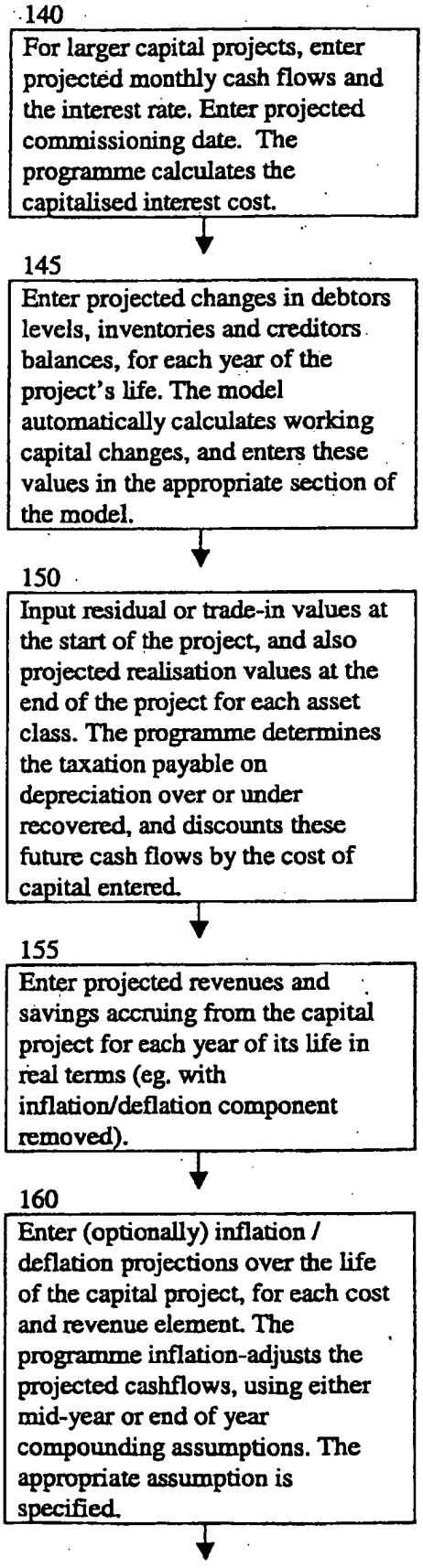


FIGURE 1
(Continued)

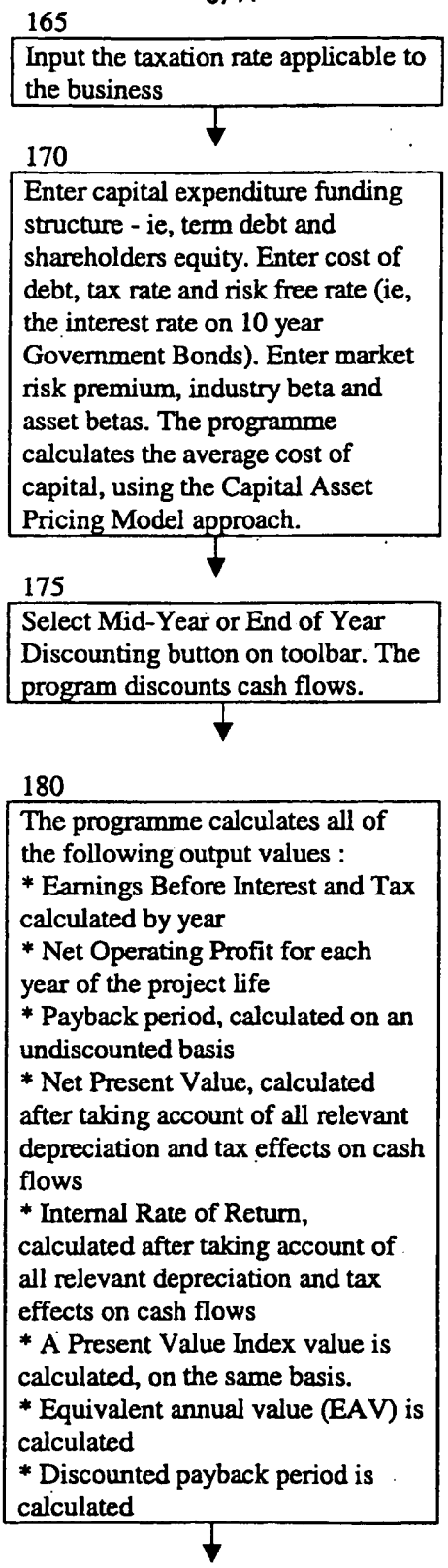


FIGURE 1 (Continued)

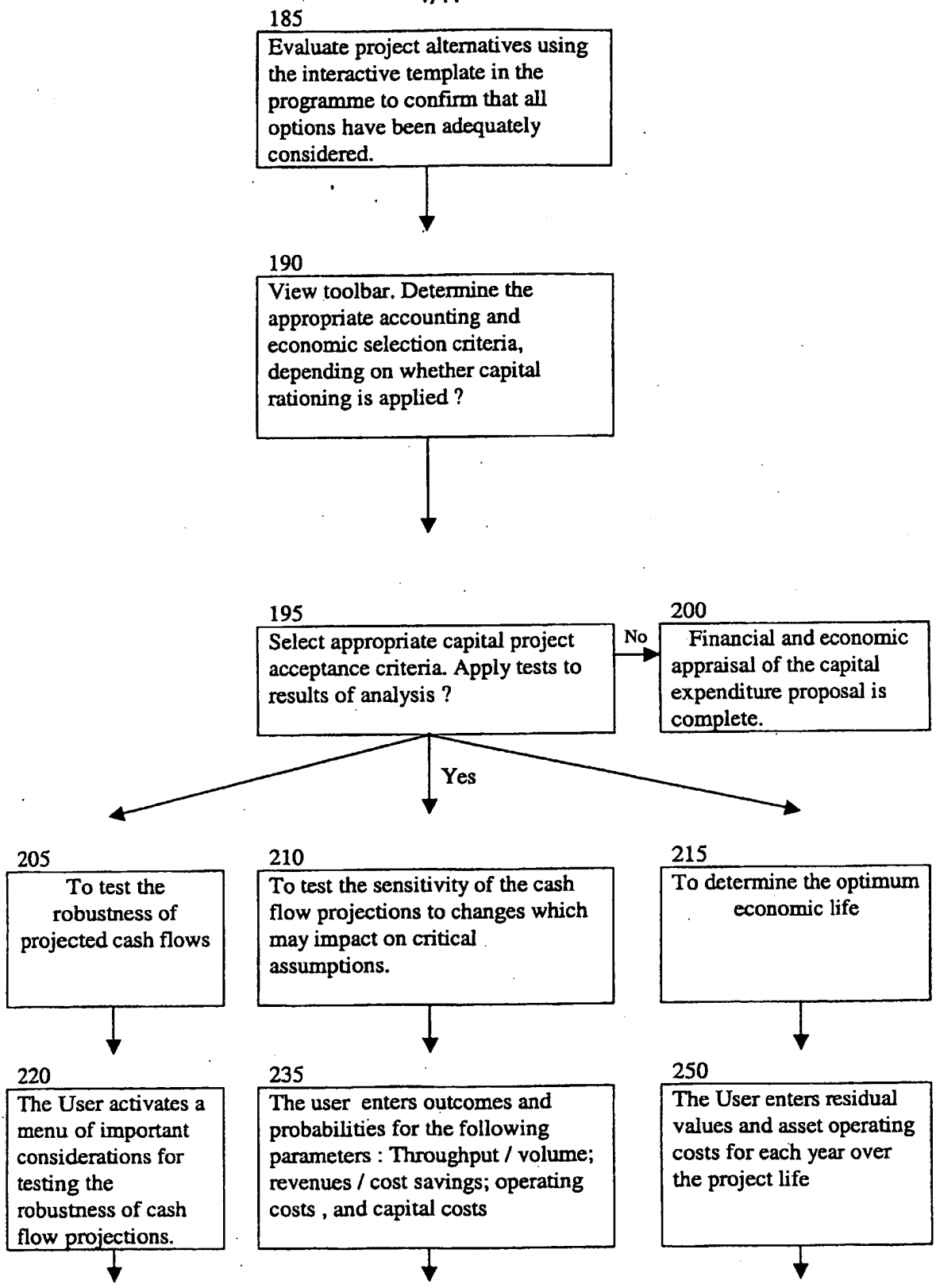


FIGURE 1 (Continued)

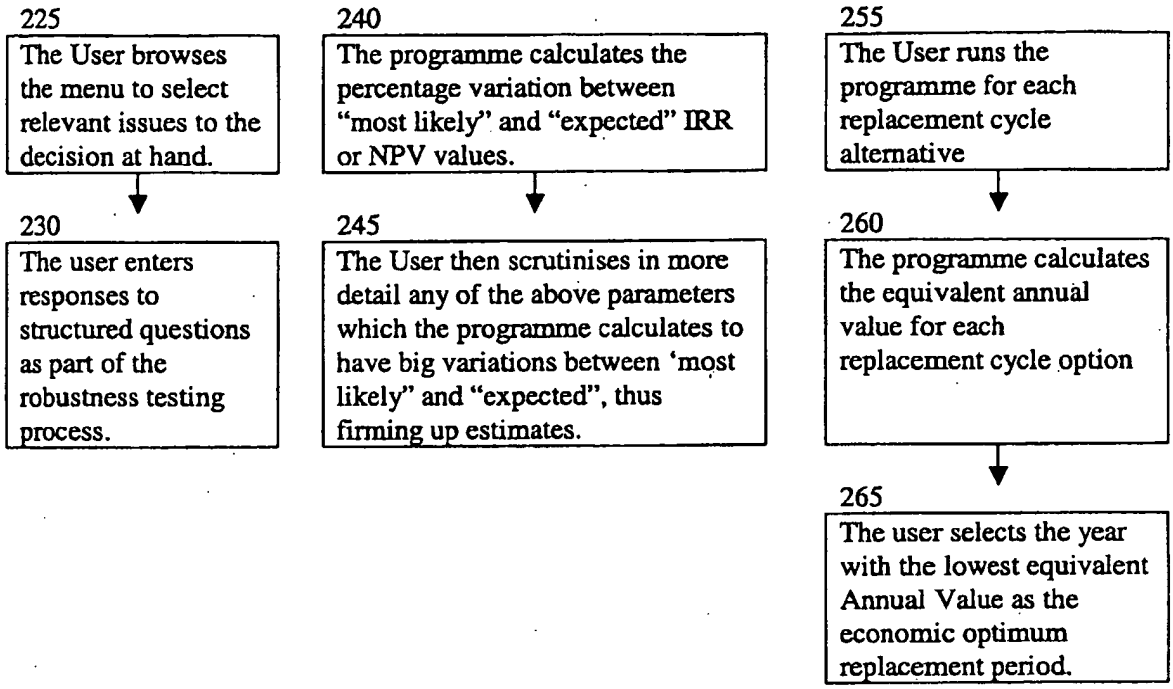


FIGURE 1 (Continued)

XYZ Industries Ltd

PROJECT DESCRIPTION: Build new manufacturing facilities and warehousing

CAPEX REQUEST NO: 99876

CAPITAL EXPENDITURE TEMPLATE

Project Start Date (Enter as mm/yyyy) 11/1999	$000 0	1	2	3	4
(Enter Year-End Capital Investment values:)	11/1999	11/2000	11/2001	11/2002	11/2003
Land	3,700				
Buildings	10,800				
Plant & equipment	35,000				
Computer - Software	3,100			3,200	
Computer - Hardware	2,030	3,000			
Site Development	2,500				
Sundry					
Other					
Include these costs in above amounts where applicable :					
Consulting Fees (Incl. Design & Specs)					
Checklist of other capex Edit Detail					
Installation Costs					
Less Disposals at start Edit Detail	-3,400				
Contingencies					
Capitalised interest Edit Detail					
= TOTAL CAPITAL COST	53,730	3,000		3,200	
Working capital increases Edit Detail	2,550	3,840	2,500		
Deduct Residual values Edit Detail				-70	-200
Total Cash Outflow	56,280	6,840	2,500	3,130	-200

ENTER PROJECT LIFE, COST OF CAPITAL AND TAX RATE Edit Detail

PROJECT LIFE 10 YEARS **COST OF CAPITAL** 9.58%

FIGURE 2A

FINANCIAL COSTS AND SAVINGS TEMPLATE

First Fiscal Year (Enter as YYYY/YYYY) 1999/2000	$000 0	1 1999/2000	2 2000/2001	3 2001/2002	4 2002/2003
(Enter Annual Costs and Revenue values:)					
Revenues/Savings (Bankable Cashflows)					
Lease payments avoided		8,500	8,500	8,500	8,755
Revenue - Product B		12,700	13,000	14,000	14,000
Revenue - Product C		4,000	4,000	4,000	4,000
Savings - Detail (Edit Detail)		1,500	2,000	2,500	2,500
Total Revenues/Savings		26,700	27,500	29,000	29,255
(Costs)					
Labour costs		1,800	1,800	1,845	1,845
Site lease costs avoided		1,200	1,200	1,200	1,200
Maintenance		1,000	1,000	1,000	1,000
Also include where applicable:					
Staff training & Recruitment	200				
Redundancy Payments	750				
Other costs (Detail) (Edit Detail)					
Total Costs excl Depr	950	4,000	4,000	4,045	4,045
- (Depr)		-9,373	-9,973	-9,973	-10,007
E.B.I.T.		13,327	13,527	14,982	15,203
Accounting Depreciation		9,373	9,973	9,973	10,007
Tax Depreciation		-9,103	-9,703	-9,703	-9,737
Taxable Profit		13,597	13,797	15,252	15,473
Tax		-5,303	-5,381	-5,948	-6,035
Tax on Depr. Recovered on sale	276.1				-26
Add back Tax Depreciation		9,103	9,703	9,703	9,737
Deduct Accounting Depreciation		-9,373	-9,973	-9,973	-10,007
NOPAT (before interest)		8,024	8,146	9,034	9,143
Accounting Depreciation		9,373	9,973	9,973	10,007
Cash Inflow	276	17,397	18,119	19,007	19,149
Net Cashflow	-56,004	10,557	15,619	15,877	19,349
Cumulative	-56,004	-45,447	-29,827	-13,950	5,399

FIGURE 2A (Continued)

(Straight Line Tax Depreciation Method Used)

Note: Enter depreciation rates for each asset category in the shaded cells. Also enter the projected year of disposal.	Tax Depreciation Rate		Accounting Depreciation Rate
Asset Class	**Straight**	**D.V.**	**(Straight)**
Land			
Buildings	5.0%	5.0%	7.5%
Plant & equipment	20.0%	25.0%	20.0%
Computer - Software	33.3%	40.0%	33.3%
Computer - Hardware	20.0%	25.0%	20.0%
Site Development	5.0%	7.5%	5.0%
Sundry	10.0%	10.0%	10.0%
Other	10.0%	10.0%	10.0%

FIXED ASSETS SCHEDULE (ACCUMULATED COSTS)	$000		
	1	2	3
	11/2000	11/2001	11/2002
Land	3,700	3,700	3,700
Buildings	10,800	10,800	10,800
Plant & equipment	35,000	35,000	35,000
Computer - Software	3,100	3,100	3,100
Computer - Hardware	2,030	5,030	5,030
Site Development	2,500	2,500	2,500
Sundry			
Other			
TOTAL	57,130	60,130	60,130
TAX DEPRECIATION	1	2	3
Land			
Buildings	540	540	540
Plant & equipment	7,000	7,000	7,000
Computer - Software	1,032	1,032	1,032
Computer - Hardware	406	1,006	1,006
Site Development	125	125	125
Sundry			
Other			
TOTAL	9,103	9,703	9,703
ACCOUNTING DEPRECIATION	1	2	3
Land			
Buildings	810	810	810
Plant & equipment	7,000	7,000	7,000
Computer - Software	1,032	1,032	1,032
Computer - Hardware	406	1,006	1,006
Site Development	125	125	125
Sundry			
Other			
TOTAL	9,373	9,973	9,973

FIGURE 2B

TAX DEPRECIATION - Straight Line Calculations

	$000		
	1	2	3
Land	3700	3700	3700
Depreciation			
Buildings	10800	10260	9720
Depreciation	540	540	540
Plant & equipment	35000	28000	21000
Depreciation	7000	7000	7000
Computer - Software	3100	2068	1035
Depreciation	1032	1032	1032
Computer - Hardware	2030	4624	3618
Depreciation	406	1006	1006
Site Development	2500	2375	2250
Depreciation	125	125	125
Sundry			
Depreciation			
Other			
Depreciation			

TAX DEPRECIATION - Diminishing Value Calculations

	$000		
	1	2	3
Land - Book Value	3700	3700	3700
Depreciation			
Buildings	10800	10260	9747
Depreciation	540	513	487
Plant & equipment	35000	26250	19688
Depreciation	8750	6563	4922
Computer - Software	3100	1860	1116
Depreciation	1240	744	446
Computer - Hardware	2030	4523	3392
Depreciation	508	1131	848
Site Development	2500	2313	2139
Depreciation	188	173	160
Sundry			
Depreciation			
Other			
Depreciation			

ACCOUNTING DEPRECIATION - Straight Line Calculations

	$000		
	1	2	3
Land	3700		
Depreciation			

FIGURE 2B (Continued)

			Year of Investment					
				Year of Disposal (End)				
Asset Class	Dispos	Index	0	0	1	1	2	2
Land	1	1	3700		0		0	
Land	2	0	0		0		0	
Land	3	0	0		0		0	
Land Depr. SL	1	3700	3700	0	3700	0	3700	0
Land Depr. SL	2	0	0	0	0	0	0	0
Land Depr. SL	3	0	0	0	0	0	0	0
Land Depr. DV	1		3700	0	3700	0	3700	0
Land Depr. DV	2		0	0	0	0	0	0
Land Depr. DV	3		0	0	0	0	0	0
Land Tax to Pay/Credit			0.00	0.00	0.00	0.00	0.00	0.00
Buildings	1	1	10800		0		0	
Buildings	2	0	0		0		0	
Buildings	3	0	0		0		0	
Buildings Depr. SL	1	10800	10800	540	10260	540	9720	540
Buildings Depr. SL	2	0	0	0	0	0	0	0
Buildings Depr. SL	3	0	0	0	0	0	0	0
Buildings Depr. DV	1		10800	540	10260	513	9747	487
Buildings Depr. DV	2		0	0	0	0	0	0
Buildings Depr. DV	3		0	0	0	0	0	0
Buildings Tax to Pay/Credit			0.00	0.00	0.00	0.00	0.00	0.00
Plant & equipment	1	1	35000		0		0	
Plant & equipment	2	6	0		0		0	
Plant & equipment	3	0	0		0		0	
Plant & equipment Depr. S	1	35000	35000	7000	28000	7000	21000	7000
Plant & equipment Depr. S	2	9800	0	0	0	0	0	0
Plant & equipment Depr. S	3	0	0	0	0	0	0	0
Plant & equipment Depr. D	1		35000	8750	26250	6563	19688	4922
Plant & equipment Depr. D	2		0	0	0	0	0	0
Plant & equipment Depr. D	3		0	0	0	0	0	0
Plant & equipment Tax to Pay/Credit			0.00	0.00	0.00	0.00	0.00	0.00
Computer - Software	1	1	3100		0		0	
Computer - Software	2	4	0		0		0	
Computer - Software	3	7	0		0		0	
Computer - Software Depr	1	3100	3100	1032	2068	1032	1035	1032
Computer - Software Depr	2	3200	0	0	0	0	0	0
Computer - Software Depr	3	3300	0	0	0	0	0	0
Computer - Software Depr	1		3100	1240	1860	744	1116	446
Computer - Software Depr	2		0	0	0	0	0	0
Computer - Software Depr	3		0	0	0	0	0	0
Computer - Software Tax to Pay/Credit			0.00	0.00	0.00	0.00	0.00	0.00

FIGURE 2 C

Return to Depn. Schedule | Reset Search | Search: Enter Category Sub Type then press Find — Weighbridges — Find

Asset Category			
Category Type	Weighing Machines (where not industry specified)		
	Data		
Category Sub Type	Estimated Useful Life	DV Rate (%)	SL Rate (%)
Batch weighers	8.0	26.4	18.6
Check weighers	8.0	26.4	18.6
Computer weighers	8.0	26.4	18.6
Digital indicators	8.0	26.4	18.6
Digital platforms	8.0	26.4	18.6
Electronic indicators	8.0	26.4	18.6
Electronic platforms	8.0	26.4	18.6
Mechanical weighing machines	20.0	11.4	7.8
Shop scales	8.0	26.4	18.6
Weigh belts	8.0	26.4	18.6
Weighbridges (above ground type)	12.5	18.0	12.0
Weighbridges (in-ground type)	25.0	9.0	6.6
Weighing machines (default class)	8.0	26.4	18.6
Weighing machines (electronic)	8.0	26.4	18.6

FIGURE 2D

SENSITIVITY ANALYSIS

1/. Sensitivity of Throughput / Volume

	Volume / Throughput (Enter)	Internal Rate of Return (IRR) (Enter)	Enter Probability %age	Expected IRR
Optimistic	1200	50	0.30	15.0
Most Likely	1000	50	0.60	30.0
Pessimistic	700	16	0.10	1.6
			100%	46.6
%age variation betweeen "Most likely" and "Expected" IRR :				3.4

2/. Sensitivity of Revenues / Cost savings

	Revenues / Cost Savings (Enter)	IRR (Enter)	Enter Probability %age	Expected IRR
Optimistic	1,200,000	50	0.10	5.0
Most Likely	1,000,000	22	0.80	17.6
Pessimistic	600,000	18	0.10	1.8
			100%	24.4
%age variation betweeen "Most likely" IRR and Expected IRR :				-2.4

FIGURE 2E

Asset Replacement Optimisation Worksheet

Go to Outputs & Tools

This worksheet is used to calculate the economic optimum point for replacing assets.

The economic replacement cycle determines an optimum balance between replacing assets often and incurring high depreciation costs, verses keeping assets for a long period and incurring costly maintenance and reduced revenue generating capacity.

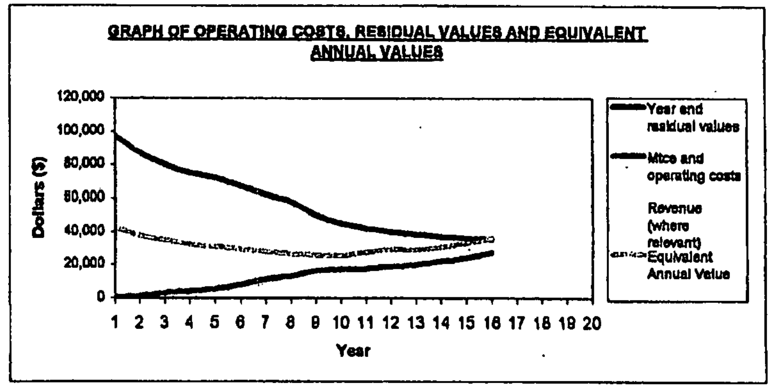
As a first step, you will need to estimate the asset's operating costs and residual values for each successive year of operation.
Only those incremental costs such as maintenance which increase or decrease as an asset ages should be considered. It could be that the revenue generating capacity of the asset also reduces as it ages. Be careful when adding inflation allowances to costs, revenues and residual values.
It is a common mistake to use inconsistent combinations of costs of capital and cashflows, giving rise to errors in DCF analysis.

A cost of capital which includes an inflation component is called a nominal rate. A cost of capital which excludes the effects of inflation is called a real rate. Hence, if a nominal cost of capital is used (in cell H41), then cash flows (years 1.. .N) should provide for inflation, as should residual value estimates. Conversely, if cashflows are assumed to stay constant over the life of the asset, then a real cost of capital should be used.

We suggest that you enter those costs and revenues which change over the life of the asset in the following worksheet, prior to running the model using each replacement period scenario. Your revenue estimates should recognise increasing downtime as the asset ages.

Year of asset operation	(Enter) Year end residual values	(Enter) Mtce and operating costs	(Enter) Revenue (where relevant)	Equivalent Annual Value
1	97000	500	112250	42390
2	87000	1200	110500	37600
3	80000	3000	110000	35100
4	76000	4000	106000	32200
5	72000	5500	103000	31100
6	67000	8000	100000	29090
7	62000	11000	100000	27608
8	58000	13000	98500	26000
9	50000	16000	89500	25500
10	45000	17000	95000	25000
11	42000	17500	95000	27000
12	40000	18000	95000	28000
13	38500	20000	95000	28500
14	37000	22000	95000	30500
15	36000	24000	80000	33000
16	35500	27000	80000	36000
17				
18				
19				
20				

View Graph



The second step involves running the Capex ® Program for all replacement cycle options. Please ensure that when completing this analysis, residual values are taken into account. The Program assumes that all values entered in the capital cost section on page 1 represent transactions which occur at the end of the period. Hence, if an asset was replaced at the end of year 4, the residual value would be entered as a credit in the year 4 column of the Financial Inputs Page.

The final step requires recording the Equivalent Annual Values (refer cell K92 on the Outputs and Tools page) for each replacement period scenario, on to the above table. If the NPV is negative, the respective row which records the lowest Equivalent Annual Value (EAV) represents the economic optimum replacement cycle. Conversely, if the NPV is positive, the row which records the highest EAV represents the economic optimum.

Note : When running the Program for each replacement cycle option, remember to adjust the year of disposal value (cell D41 on Inputs Page.)

FIGURE 2F

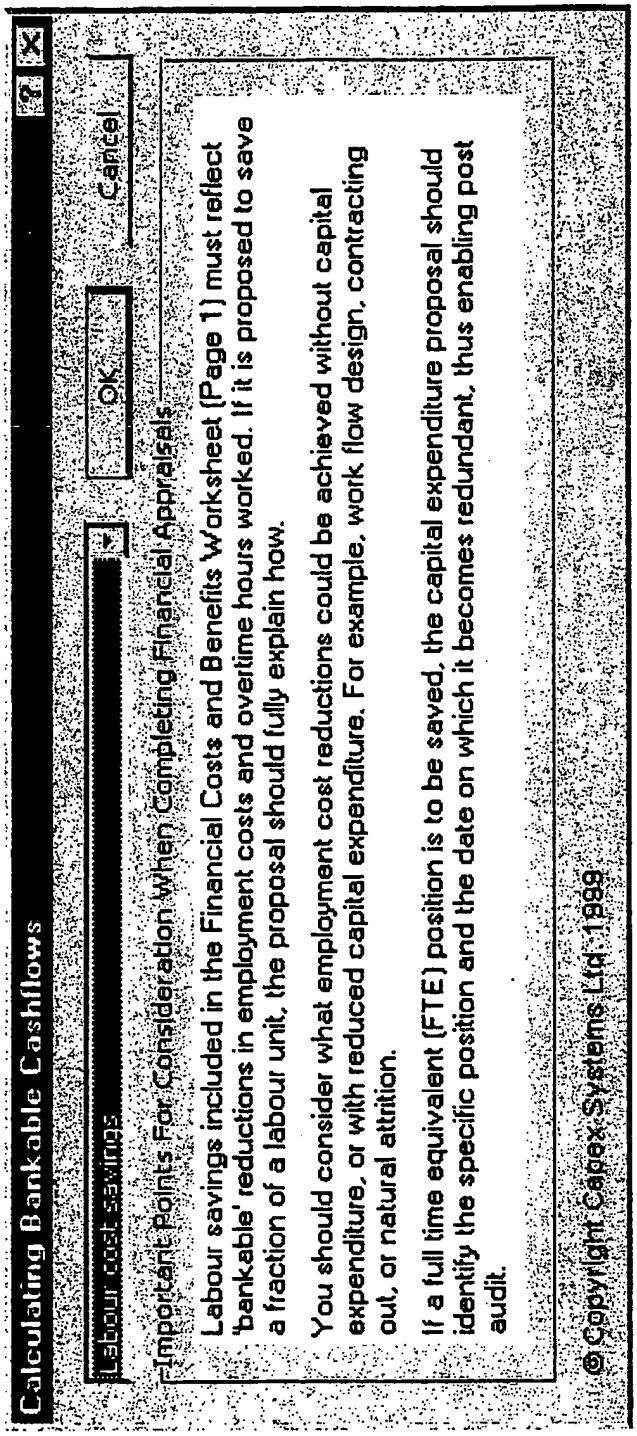

Calculating Bankable Cashflows
Labour cost savings
OK
Cancel
Important Points For Consideration When Completing Financial Appraisals
Labour savings included in the Financial Costs and Benefits Worksheet (Page 1) must reflect 'bankable' reductions in employment costs and overtime hours worked. If it is proposed to save a fraction of a labour unit, the proposal should fully explain how.
You should consider what employment cost reductions could be achieved without capital expenditure, or with reduced capital expenditure. For example, work flow design, contracting out, or natural attrition.
If a full time equivalent (FTE) position is to be saved, the capital expenditure proposal should identify the specific position and the date on which it becomes redundant, thus enabling post audit.
© Copyright Capex Systems Ltd 1999

FIGURE 2 G

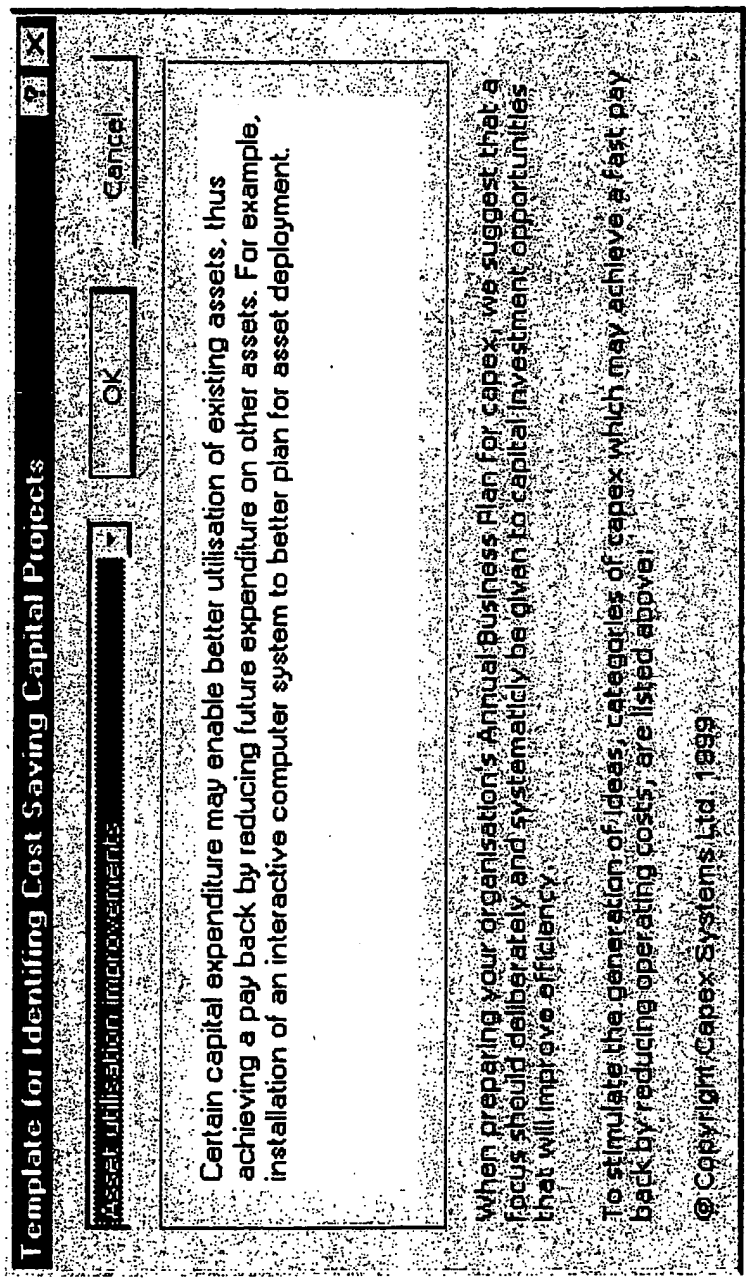

Template for Identifing Cost Saving Capital Projects
Asset utilisation improvements
OK
Cancel
Certain capital expenditure may enable better utilisation of existing assets, thus achieving a pay back by reducing future expenditure on other assets. For example, installation of an interactive computer system to better plan for asset deployment.
When preparing your organisation's Annual Business Plan for capex, we suggest that a focus should deliberately and systematicly be given to capital investment opportunities that will improve efficiency.
To stimulate the generation of ideas, categories of capex which may achieve a fast pay back by reducing operating costs, are listed above.
© Copyright Capex Systems Ltd 1999

FIGURE 2 H

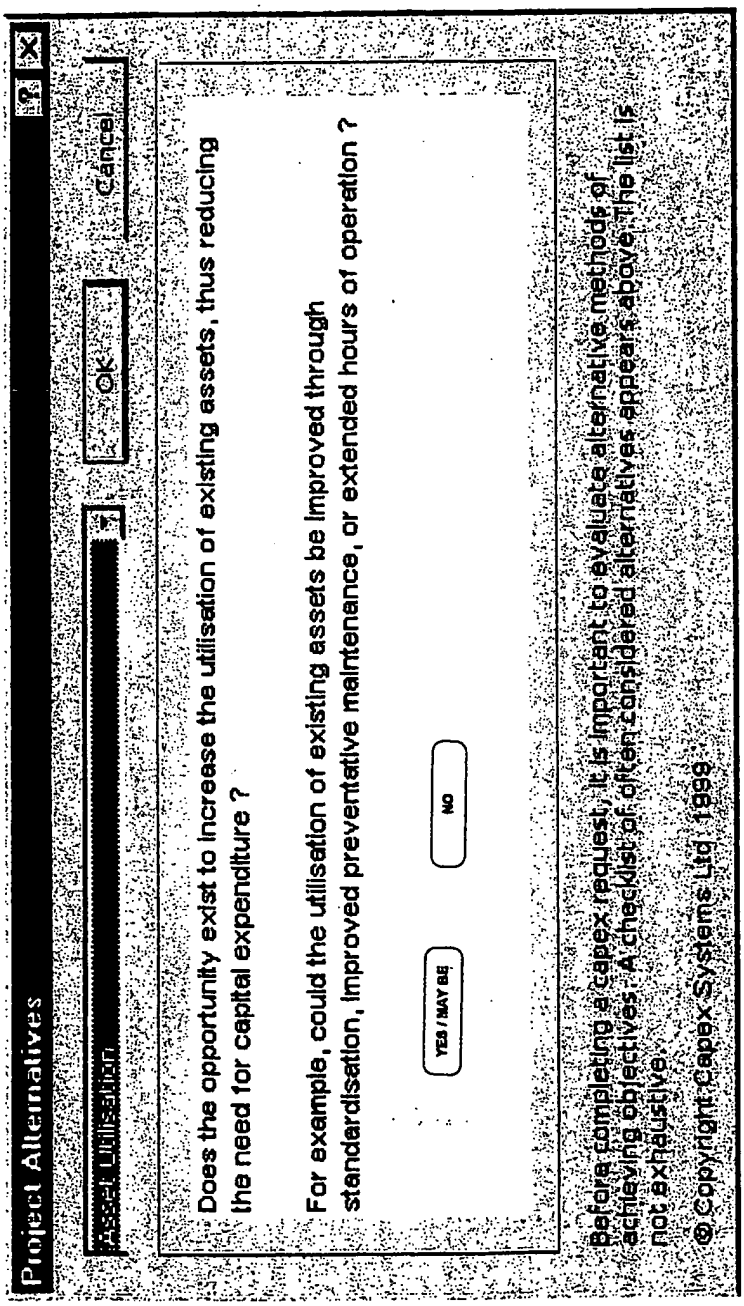
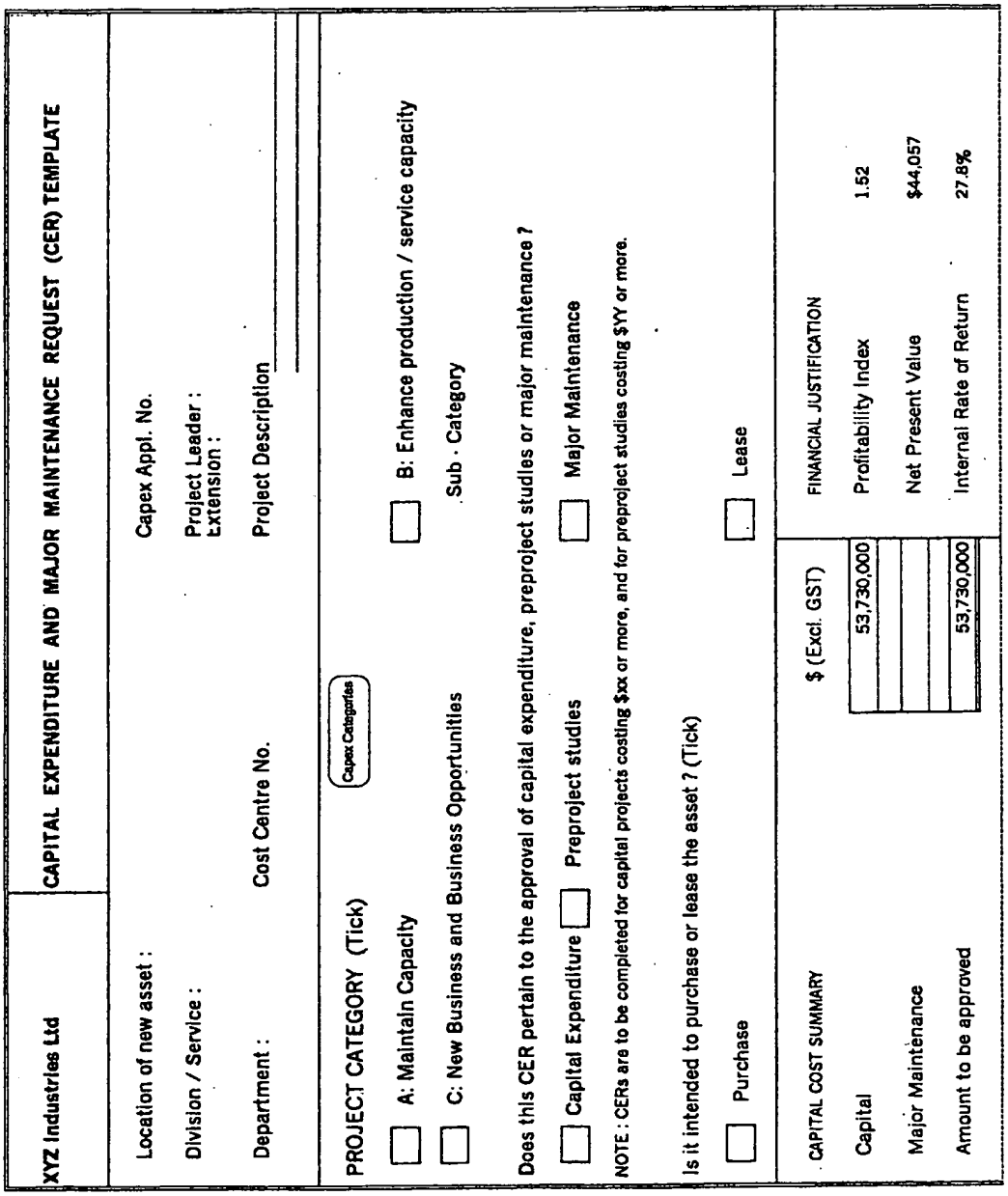

Project Alternatives
Asset Utilisation
OK
Cancel
Does the opportunity exist to increase the utilisation of existing assets, thus reducing the need for capital expenditure ?
For example, could the utilisation of existing assets be improved through standardisation, improved preventative maintenance, or extended hours of operation ?
YES / MAY BE
NO
Before completing a capex request, it is important to evaluate alternative methods of achieving objectives. A checklist of often considered alternatives appears above. The list is not exhaustive.
© copyright Capex Systems Ltd 1998

FIGURE 2I



XYZ Industries Ltd

CAPITAL EXPENDITURE AND MAJOR MAINTENANCE REQUEST (CER) TEMPLATE

Location of new asset :

Division / Service :

Department :

Cost Centre No.

Capex Appl. No.

Project Leader :
Extension :

Project Description

PROJECT CATEGORY (Tick) (Capex Categories)

☐ A: Maintain Capacity

☐ B: Enhance production / service capacity

☐ C: New Business and Business Opportunities

Sub - Category

Does this CER pertain to the approval of capital expenditure, preproject studies or major maintenance ?

☐ Capital Expenditure ☐ Preproject studies ☐ Major Maintenance

NOTE : CERs are to be completed for capital projects costing $xx or more, and for preproject studies costing $YY or more.

Is it intended to purchase or lease the asset ? (Tick)

☐ Purchase ☐ Lease

CAPITAL COST SUMMARY	$ (Excl. GST)
Capital	53,730,000
Major Maintenance	
Amount to be approved	53,730,000

FINANCIAL JUSTIFICATION	
Profitability Index	1.52
Net Present Value	$44,057
Internal Rate of Return	27.8%

FIGURE 2J

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ00/00067

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: G06F 17/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT - Keywords
USPTO - Keywords

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 76415/96 A,(GLW SOFTWARE PTY LIMITED) 3 July 1997 See whole document	1-3,7,9,17,18,19
A	US, A, 5727161 (PURCELL) 10 March 1998 See whole document	

☐ Further documents are listed in the continuation of Box C ☐ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 September 2000	21 SEP 2000
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **Stephen Lee** Telephone No : (02) 6283 2205

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ00/00067

Box I **Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :

because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos :

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos :

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II **Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

Claims 1-19 being for a capital expenditure decision support system with asset input means, depreciation rate selection means and computing means.
Claims 20-23 being for a capital expenditure decision support system with selection means, storage means and display means.
Claims 24-28 being for a capital expenditure decision support system with selection means, computation means, storage means and display means.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.